POLI 395: Introduction to Statistics

101 Sewall Hall, TR 9:25a-10:40a

Dr. Justin Esarey
Assistant Professor of Political Science
Rice University

Office: 108 Herzstein Hall
Office Hours: M T 2:00 – 3:00 PM
E-mail: justin@justinesarey.com
Phone: 678-383-9629

Course Objectives and Learning Outcomes

This course introduces students to basic ideas in scientific epistemology, social science research design, statistical analysis, and the application of all these ideas to substantive questions in political science.

Students will be able to:

1. understand basic approaches to the scientific study of the social world to substantive topics in political science;
2. execute and interpret statistical analysis of quantitative political data to answer about substantive questions in political science; and
3. recognize and understand threats to inference based on empirical data in political science, including the weaknesses of research designs and statistical analyses.

Grading Policies and Assignment Details

Grade Components:

- Homework: 25%
- Exam 1: 25%
- Exam 2: 25%
- Final Exam: 25%

Grading Scale:

100%-97%: A+
96.9%-93%: A
92.9%-90%: A-
89.9%-87%: B+
86.9%-83%: B
82.9%-80%: B-
79.9%-77%: C+
76.9%-73%: C
72.9%-70%: C-
69.9%-67%: D+
66.9%-63%: D
62.9%-60%: D-
>59.5%: F

Exams: There will be three exams in this class, two midterms and a final. All exams are cumulative, but will focus on material learned since the last exam. Exams will be held in class. No materials, references, or other students may be consulted during an exam.

Homework: Homework problem sets will be distributed during class. I encourage collaborative work on problem sets: the goal of a homework problem set is to help you learn the material and enable you to perform well on the (non-collaborative!) research paper. With that said, simply copying another student's homework answers is not permitted and will be treated as academic dishonesty.

Attendance: Attendance is mandatory in this class. No points are deducted on the basis of an absence alone; however, anything I teach in class is testable material, and not everything I teach in class will be in the course reading material.

COURSE POLICIES

T/A Office Hours: The teaching assistant for this class is Philip Santoso, a PhD student in the political science department. Philip will hold office hours for four hours per week. You are welcome to have Philip assist you with questions that you may have. The time and location of these office hours are Wednesday, 10:00 AM – 12:00 PM, and Friday, 1:00 PM – 3:00 PM in Herzstein 122.

Courtesy: To ensure that everyone has the opportunity to learn without undue distraction, please follow these guidelines:

(1) Turn off your cell phone.
(2) Do not talk during class unless called upon by the instructor.
(3) Do not read newspapers, magazines, or non-class-related internet web sites (e.g., Facebook) during class.
(4) Do not enter class late or leave early unless it is an emergency or you have cleared it with me in advance.

If you violate these rules, I may ask you to leave the classroom. I reserve the right to penalize your grade for repeated inappropriate behavior, up to and including permanent removal from the class.

Late Work: Assignments are due at the date and time I specify for the assignment. Late homeworks will be marked off at 5 percentage points for the first 24 hours late, and an additional 10 percentage points for every subsequent 24 hours late.

Exams may not be taken late. Failing to take the exam at the scheduled time will result in no credit for the exam.

Penalties for late homeworks or missed exams may be waived under the following three circumstances:

(1) a death in the immediate family (parent, spouse, sibling, or child) within two weeks before the assignment due date;

(2) in the event of an unforeseeable medical emergency affecting you, your spouse, or your child; or
(3) participation in a Rice-sponsored academic or sporting event.

In the event of (1) or (3), you must give me **at least 24 hours advance notice and preferably more** (via e-mail or a phone call) that you will miss the exam/homework, or it may not be made up. I may require supporting documentation. All penalty waivers are at the discretion of the instructor. Under these circumstances, I will extend your homework due date or schedule you a make-up exam time. **Important note: conflicts with a work schedule, non-academic trip, or vacation are not a valid reason to miss an exam or any other assignment** and cannot be the basis for a penalty waiver.

Honor Code/Academic Misconduct: All forms of academic misconduct will be handled according to the Rice University Honor Code. Details on the Honor Code are available at http://honor.rice.edu/honor-system-handbook/.

If you ever have any questions about what you should do to stay within the honor code on a particular assignment, **contact me with your question and I can assist you**. I cannot guarantee a timely response unless you contact me at least 24 hours in advance of the time the assignment is due.

Students with Disabilities: If you have a disability and require accommodation in this class, please contact me as soon as possible (within the first two weeks of class) to discuss these accommodations. You will also need to contact the Disability Support Services Office (telephone extension: 5841) in the Allen Center.

Syllabus Change Policy: All policies of this syllabus may be changed by Prof. Esarey with advance notice.

COURSE MATERIALS

Required Texts:

- Kellstedt and Whitten. 2013. *The Fundamentals of Political Science Research, Second Edition.* Cambridge University Press.
- Maindonald and Braun. 2013. *Data Analysis and Graphics using R: An Example Based Approach, Third Edition.* Cambridge University Press.

Other readings are available on the OWL-Space website.

Software: This course will teach material primarily through R. R is free and available for Windows and Macintosh from http://cran.r-project.org/.

I recommend installing The RStudio IDE environment for writing and executing code in R; RStudio is also free and available for Windows and Macintosh at http://www.rstudio.com.

All students must have a valid Rice e-mail address and login (and access to the OWL-space website) to participate in this course.

COURSE OUTLINE AND ASSIGNED READINGS

1) Introduction and syllabus review. What is this class good for?

2) What is science? Is political science really science?

Readings:

a. Kellstedt and Whitten, Ch. 1 up to and including Section 1.2.
b. Alan Musgrave, "How Popper [Might Have] Solved the Problem of Induction." *Philosophy* 19 (January 2004): pp. 19-31. URL: http://goo.gl/a1Tqfl.
c. Andrew Ehrenberg, "Even the Social Sciences Have Laws." *Nature* 365 (September 30, 1993): p. 385. URL: http://goo.gl/qXJC8p
d. Alex Rosenberg and Tyler Curtain, "What is Economics Good for?" *The New York Times* (August 24, 2013). URL: http://goo.gl/n1aRD0.

3) Research questions, theories, concepts, and hypotheses

Readings:

a. Kelllstedt and Whitten, Ch. 1 and 2.

4) Research design I: the logic of experimentation and causal inference

Homework #1 distributed.

Readings:

a. Kellstedt and Whitten, Ch. 3 and Ch. 4 up to and including Section 4.2.
b. Joel Turner, "The Messenger Overwhelming the Message: Ideological Cues and Perceptions of Bias in Television News." *Political Behavior* 29 (December 2007): 441-464. URL: http://goo.gl/ENqx9w.

5) Research Design II: non-experimental, large sample designs

Readings:

a. Kellstedt and Whitten, Ch. 4, Section 4.3-end.
b. Alan S. Gerber and Donald P. Green, "Do Phone Calls Increase Voter Turnout? A Field Experiment." *Public Opinion Quarterly* 65 (Spring 2001). URL: http://goo.gl/KAdNMW.
c. Jeffrey S. DeSimone, "Fraternity Membership and Binge Drinking." *Journal of Health Economics* 26 (September 2007), 950-967. URL: http://goo.gl/nBK9ON.
d. James Fowler, "The Colbert Bump in Campaign Donations: More Truthful than Truthy," PS: Political Science and Politics 41 (July 2008): 533-539. URL: http://goo.gl/O2Ujt2.

6) Research Design III: non-experimental, case study designs

Homework #2 distributed.

Readings:

a. James Mahoney. "Strategies of Causal Inference in Small-N Analysis." *Sociological Methods and Research* 28 (2000): 387-424. URL: http://goo.gl/HCjR6O.
b. Ashutosh Varshney, "Ethnic Conflict and Civil Society: India and Beyond." World Politics 53 (April 2001), 362-398, especially 370-374. URL: http://goo.gl/eZnmCV.

7) Measurement: levels of measurement, reliability, and validity

Readings:

a. Kellstedt and Whitten, Ch. 5 up to and including Section 5.8.
b. Jeffrey A. Segal and Albert D. Cover, "Ideological Values and the Votes of US Supreme Court Justices." *American Political Science Review* 83 (June 1989), 557-564. URL: http://goo.gl/Wxpc7N.

********** **EXAM ONE CUTOFF** **********

8) Techniques for and problems with social scientific data collection

Readings:

a. Burt Monroe, Michael Colaresi, and Kevin Quinn. "Fightin' Words: Lexical Feature Selection and Evaluation for Identifying the Content of Political Conflict." *Political Analysis* 16 (2008): 372-403. URL: http://goo.gl/Z8KLGb.
b. Steven Levitt and Sudhir Venkatesh, "An Economic Analysis of a Drug-Selling Gang's Finances." *Quarterly Journal of Economics* 115 (2000): 755-789. URL: http://goo.gl/lZrv9F.
c. Yale IRB Training, "Introduction/Ethical Overiew." URL: http://goo.gl/HKzTf8. Special note: make sure to read the following links the module: "Introduction" (http://goo.gl/HKzTf8), "Respect for Persons" (http://goo.gl/FeP3Ov), "Beneficence" (http://goo.gl/17F6fh), "Justice" (http://goo.gl/KGNtYc), and "The importance of conducting research ethically" (http://goo.gl/7BXOZX).

9) Descriptive Statistics and Graphs with R/RStudio

Homework #3 distributed.

Readings:

a. Kellstedt and Whitten, Ch. 5. from Section 5.9 to the end.
b. Jo Hardin, "An R Tutorial." URL: http://goo.gl/UzzSL7.
c. Maindonald and Braun, Chapters 1-2.

10) Probability distributions and sampling

Readings:

a. Kellstedt and Whitten, Chapter 6.
b. Maindonald and Braun, Chapter 4, Sections 4.1-4.2.

11) Basic hypothesis testing

Readings:

a. Kellstedt and Whitten, Ch. 7, Sections 7.1-7.3 and 7.4.2.
b. Jeffrey J. Mondak, "Newspapers and Political Awareness." *American Journal of Political Science* 39 (May 1995); see especially pp. 523-525, for a two-sample t-test. URL: http://goo.gl/oydzPW.

12) Crosstabs and the χ^2 test

Homework #4 distributed.

Readings:

a. Kellstedt and Whitten, Ch. 7, Section 7.4.1
b. Maindonald and Braun, Chapter 4, Section 4.3.
c. Second look: Alan S. Gerber and Donald P. Green, "Do Phone Calls Increase Voter Turnout? A Field Experiment." *Public Opinion Quarterly* 65 (Spring 2001), 75-85; see especially p. 79 for data for a chi-squared test. URL: http://goo.gl/KAdNMW.

13) Correlation

Readings:

a. Kellstedt and Whitten, Ch. 7, Section 7.4.3
b. Amy Caiazza, "Does Women's Representation in Elected Office Lead to Women-Friendly Policy?" *Women and Politics* 26 (2004), 35-70. URL: http://goo.gl/C417VH.

********** **EXAM TWO CUTOFF** **********

14) Regression I: theory and basics

Readings:

a. Kellstedt and Whitten, Ch. 8., Sections 8.1-8.4.
b. Maindonald and Braun, Ch. 5, Section 5.1 and 5.4.

15) Regression II: inference, multiple regression, and interpretation

Homework #5 distributed.

Readings:

a. Kellstedt and Whitten, Ch. 9
b. Maindonald and Braun, Ch. 5, Section 5.3 and Ch. 6, Section 6.1-6.3.

16) Regression III: applied examples and categorical explanatory variables

Readings:

a. Kellstedt and Whitten, Ch. 10, Sections 10.1-10.2.
b. Maindonald and Braun, Ch. 7, Sections 7.1-7.3
c. John J. Donohue III and Steven D. Levitt, "The Impact of Legalized Abortion on Crime," *The Quarterly Journal of Economics* 46 (May 2001): 379-420. URL: http://goo.gl/gtLIlf.
d. Alan Abramowitz, "Forecasting the 2008 Presidential Election with the Time-for-Change Model." *PS: Political Science and Politics* 41 (October 2008): 691-695. URL: http://goo.gl/DLckXv.

17) Regression IV: assumptions underlying regression

Homework #6 distributed.

Readings:

a. Kellstedt and Whitten, Ch. 8, Section 8.5, and Ch. 10, Section 10.4-10.5
b. Maindonald and Braun, Ch. 5, section 5.2; Ch. 6, Sections 6.4-6.6; Ch. 7, Section 7.4-7.5.

18) LPM, logit and probit I: studying binary dependent variables

Readings:

a. Kellstedt and Whitten, Ch. 11, Sections 11.1-11.2
b. Maindonald and Braun, Ch. 8, Sections 8.1-8.2.

19) Logit and probit II: plotting and interpreting marginal effects

Homework #7 distributed.

Readings:

a. G. King, M. Tomz, and J. Wittenberg, "Making the Most of Statistical Analyses: Improving Interpretation and Presentation." *American Journal of Political Science* 44 (2000): 347-361. URL: http://goo.gl/9StFf8.
b. D. Sunshine Hillygus and Todd G. Shields, "Moral Issues and Voter Decision Making in the 2004 Presidential Election." *PS: Political Science and Politics* (April 2005), 201-209

20) Interaction effects

Readings:

a. Kellstedt and Whitten, Ch. 10, Section 10.3
b. T. Brambor, W. R. Clark, and M. Golder, "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* 14 (2006): 63-82. URL: http://goo.gl/iQrY5a.
c. Justin Esarey and Gina Chirillo, "'Fairer Sex' or Purity Myth? Corruption, Gender, and Institutional Context." *Politics and Gender* (forthcoming). URL: http://goo.gl/2yusN0.